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PROBLEMS.

51. *By Dr. N. R. Oliver, Sacaton, Arizona.*—Given

$$(x^2 + y^2)y = 39, \quad (1)$$

$$x^4 + y^4 = 97, \quad (2)$$

to find x and y by quadratics.

52. *By J. M. Curtis, Ovid, Mich.*—A hare starts 10 rods north of a hound and runs at an angle of 45° with the meridian. The hound pursues in a straight line and in such a direction that he will intercept the hare without changing his course. Supposing the hound to run n times as fast as the hare, how far will he run before he catches the hare?

43. By request of *A. W. Mason.*—If a ball of 6 in. diameter is discharged from a canon at the rate of 1 mile in 7 seconds, how much greater force will be required to throw a ball of double the weight with the same velocity, taking into account the resistance of the air and the diameters of the balls?—*Silliman's Physics*, page 108.

54. By Prof *J. Scheffer*, Gambier, O.—Let ABC represent a spherical triangle and M the centre of the sphere. Find the three distances of the centre of gravity of the spherical triangle ABC from the three planes ABM, ACM and BCM.

55. By request of *Walter Siverly.*—A very small bar of matter is moveable about one extremity which is fixed half way between two centers of force attracting inversely as the square of the distance; if l be the length of the bar, and $2a$ the distance between the centers of force, prove that there will be two positions of equilibrium for the bar, or four, according as the ratio of the absolute intensity of the more powerful force to that of the less powerful is or is not greater than $(a + 2l) \div (a - 2l)$: and distinguish between the stable and unstable positions.—*Cambridge Problems*, 1845.

56. By *G. W. Hill.*—Find the real value of $(\sqrt{-1})^{\sqrt{-1}}$

57. By Prof. *E. W. Hyde.*—Find the nature of the curve represented by the equation

$$4b^2(x^2 + y^2)\left[(x - a)^2 + y^2 - b^2\right] - a^2y^2\left[(x - a)^2 + y^2\right] = 0,$$

and show that when a certain relation exists between a and b, the locus reduces to a right line perpendicular to the axis of x, and a 3rd degree curve which is a trisectrix.

58. By Prof. *W. W. Johnson.*—Referring to prob. 33, and Mr. Stille's figure in No. 9, find the rect. coordinates of the doub. pt. not on the axis of x.